

Role of Health Departments in Hearing Conservation

ARAM GLORIG, M.D., and ALBERT L. CHAPMAN, M.D.

HEARING CONSERVATION deserves top priority as a public health problem. Few voluntary agencies engage in promoting it and even fewer State and local health departments have shown any interest.

To initiate a program that would stimulate the interest of public health agencies in hearing conservation a conference was held in Washington, D.C., on May 18-19, 1959. This conference had two important results; a 55-page pamphlet entitled "Health Aspects of Hearing Conservation" prepared by the key participants was published by the American Academy of Ophthalmology and Otolaryngology, and an advisory committee was organized to assist the Public Health Service to promote more interest in hearing conservation.

Because of the wide range of activities that may be engaged in, suggestions or recommendations for programs for State and local health departments must vary in complexity and magnitude. It is important that each public health agency, no matter how small, participate in a hearing conservation program.

Only a few representatives of health departments attended the Washington conference since the primary aim of the meetings was to define the task that needed to be done rather than define the agencies by which these tasks should be performed. Therefore, it seemed important for the advisory committee to cull

from the proceedings of the conference some activities which could be carried out by State and local health departments. In preparing a list of such activities, the wide disparity in the financial and personnel resources of the various State and local health departments must be kept in mind.

The Goal

Health departments are concerned with deaths and disabilities whenever their numbers constitute a significant community health problem. The number of deaf persons, persons with speech difficulties, and persons with hearing impairment is so large that hearing conservation must be considered to be a public health problem of no mean size. The number of those with some degree of hearing impairment in one or both ears is not known. However, Dr. Howard Rusk, in an article published in the *New York Times* of August 13, 1961, estimated that nearly 6 million persons in the United States have impaired hearing. Results of surveys indicate the number increases sharply after age 40 (see table).

Moreover, the hallmark of this particular disability is its preventability. Primary prevention may be achieved through improved control of certain communicable diseases such as meningitis, mumps, and rubella (in pregnant women), and early recognition of Rh incompatibilities. Secondary prevention may be achieved through early diagnosis and adequate treatment of infections and allergic diseases of the middle ear during early childhood, more judicious use of certain drugs, and avoidance of trauma, such as excessive noise.

Dr. Glorig is director of research, Subcommittee on Noise, Committee on Conservation of Hearing, American Academy of Ophthalmology and Otolaryngology, and Dr. Chapman is Assistant Surgeon General and chief, Division of Accident Prevention, Public Health Service.

The ultimate goal of each community should be to mobilize available health resources so that (a) every deaf person in the community and every person with a speech or hearing impairment or condition leading to hearing impairment is identified, (b) all impairments are evaluated by qualified professional personnel, and (c) correction of impairments or the provision of compensatory prosthetic appliances is arranged by referral to appropriate physicians or agencies.

Theoretically, at least, health departments might become active in four major areas: prevention, education, care, and rehabilitation. Activities necessary to support these are personnel recruitment and training, public education, professional education, and research. It may be helpful to discuss each activity separately.

Prevention

Hearing loss and deafness may be due to congenital defects, or be the result of hereditary and systemic disease, infections (particularly in childhood), Rh incompatibility, drugs, trauma, noise, and aging. Opportunities to prevent hearing loss and deafness are limited by incomplete knowledge concerning etiologic factors and, consequently, the absence of practical control measures. Obviously, adequate medical care during the course of infectious diseases may

prevent or minimize damage to the hearing apparatus. The control of excessive noise levels, particularly in industrial environments, may reduce the number and severity of hearing impairments.

But the development of additional techniques of prevention must await the results of research, some of which is now underway. A great deal more investigation must be initiated and completed, however, before preventive measures of maximum effectiveness can be recommended.

The Committee on Conservation of Hearing, American Academy of Ophthalmology and Otolaryngology, is carrying out a long-term research program supported by the academy and the National Institutes of Health to determine the best methods of carrying out hearing screening programs in school populations. Its purpose is to establish national standards for testing and classification of hearing loss in children. The standards will then be available for use by State and local health departments in carrying out early casefinding aspects of hearing conservation.

Detection

Public health workers can make a substantial contribution to hearing conservation in detection activities. As a principle, screening for hearing defects should be a part, with few ex-

Hearing loss among males 10 to 59 years of age, United States

Age group (years)	Size of survey sample	Males with hearing level of 15 decibels or more at 1,000 cycles per second		Males with hearing level of 30 decibels or more at 1,000 cycles per second		Confidence limits of 99.7 percent
		Percent of survey tested ¹	Number in U.S. population (extrapolated) ¹	Percent of survey tested ¹	Number in U.S. population (extrapolated) ¹	
10-19-----	6, 204	3	400, 000	1	100, 000	± 2
20-29-----	8, 542	3	300, 000	1	100, 000	± 2
30-39-----	7, 000	6	700, 000	1. 5	200, 000	± 2
40-49-----	6, 836	12	1, 300, 000	3	300, 000	± 2
50-59-----	2, 867	21	1, 700, 000	4	330, 000	± 3
10-59-----	31, 449	² About 4,400,000		² About 1,030,000		

¹ Percentages and extrapolated figures are rounded.

² Out of 54 million (U.S. 1955 census estimate).

SOURCE: Health Aspects of Hearing Conservation. Transactions of the American Academy of Ophthalmology and Otolaryngology, Supplement, November-December 1959.

ceptions, of every physical examination. Hearing tests could well be included in the examinations given upon admission to hospitals, nursing homes, and prisons; prior to employment, placement, and periodically in industry; in employee health programs and prepaid voluntary health programs; to special groups such as applicants for insurance and drivers' licenses, infants at well-baby clinics (new tests have been devised for the use of pediatricians), school children, and military populations. In addition, health departments can conduct demonstrations of mass screening for hearing defects in various population groups.

Following are some specific tasks in detection for the public health worker.

1. Stimulating the inclusion of hearing screening procedures in the situations previously listed.

2. Engaging in educational activities to motivate the public to seek preventive examinations and further to convince physicians of the importance of performing them.

3. Providing audiometric equipment and proper testing environment to persons, agencies, schools, or industries interested in hearing screening programs.

4. Noticing during home visits evidence of hearing or speech defects in members of the family.

5. Participating in screening activities at the request of school authorities, hospital administrators, industry executives, or others.

6. Setting an example for the community by performing hearing examinations of all health department employees and local public employees.

7. Cooperating with State and local voluntary agencies and medical societies interested in hearing conservation.

Care and Rehabilitation

The essential ingredients of a good care program are (a) the early referral of all persons with suspected hearing loss to a physician qualified to evaluate and treat their conditions in close collaboration with audiologists, speech pathologists, psychologists, and other professional persons; (b) recommendation of proper medical or surgical treatment or prosthetic appliances to correct or minimize the hearing de-

fect; (c) training in the use of hearing aids when indicated; (d) adequate followup of patients; and (e) the development of more effective patient education techniques and programs. There is an equal responsibility to evaluate and treat with the same thoroughness all attendant speech defects.

The health department can contribute to the care of persons with speech and hearing defects by providing referral and followup services, including referral of eligible hearing-handicapped persons to vocational rehabilitation services, by assisting in patient and parent education, cooperating with medical societies in providing definitive diagnoses for selected groups of patients and thereby supporting the development of speech correction education in the schools, and by cooperating in the establishment of audiology centers.

The provision of care primarily is the responsibility of private physicians; the role of public health workers is usually supportive. However, when facilities and services for the evaluation and treatment of persons with speech and hearing impairments are nonexistent or inadequate it becomes the responsibility of the health departments to work with State and local medical societies, medical centers, voluntary agencies, and others to develop adequate local facilities and services.

Good detection and care services are integral parts of a total rehabilitation program. However, many persons with hearing defects and related speech defects are denied the advantages of normal living or productive work because adequate rehabilitative services and facilities do not exist or are not known to the person needing them.

Health departments may supplement the efforts of State and local rehabilitation agencies (public or voluntary), or where adequate services do not exist and leadership is required, the health department should cooperate with State and local rehabilitation agencies in the following tasks:

- Determining the extent of the need for rehabilitation services and facilities.
- Stimulating State and local efforts to provide them.
- Supporting the rehabilitation program once it is underway, and

- Establishing medical rehabilitation of the hearing-handicapped as a sizable public health problem.

Recruitment

In addition to the professions traditionally represented on State and local health department staffs, persons in disciplines new to these agencies may have to be recruited to make significant progress in hearing conservation. The number and type of personnel needed depends largely upon the program activities that are planned following a survey of need.

Among those who may be needed either full time or part time are speech therapists, audiometric technicians, audiologists, otologists, psychiatrists, psychologists, and special education teachers. In addition, the duties of public health nurses, health educators, and social workers may be modified to support hearing conservation activities.

Training

One of the most important roles of health departments will be to arrange for suitable educational opportunities, including inservice training, for staff members engaged in full-time hearing conservation programs as well as training for school audiometric technicians, volunteer workers, special education teachers, and nurses.

Existing hearing centers may offer the setting for such training. Efforts should be made to organize training courses that are based on need. State and local health departments should encourage hearing centers to offer short intensive courses on how to organize and conduct hearing conservation programs. Detection programs can be conducted by personnel who have been specially trained for specific purposes such as screening school children and hearing conservation in industry. With proper supervision by the health department personnel, much can be accomplished with a minimum financial expenditure.

Public Education

An informed public can make the task of hearing conservation much easier. The State or local health department may utilize the traditional methods of mass communication to get

the facts to the public; however, word-of-mouth communication is admittedly a more effective way to motivate people. Many educational opportunities exist when public health nurses visit a family, when physicians examine their patients, and when screening examinations are held. An informed public leads to better and more widespread preventive measures. "Have your hearing tested once a year" can become as familiar as "See your dentist twice a year."

Research

State and local health departments have had few resources with which to conduct research studies. They have lacked both personnel and funds. Recently, interest in research has been growing and funds have become more readily available. However, even modestly supported health departments, when the motivation is strong enough, can engage in applied clinical research and conduct limited surveys and local investigations. Often such surveys and investigations yield the statistical data which supports requests for more adequate appropriations for hearing conservation.

State and local health departments are the logical groups to do limited field research or at least to support surveys to determine the hearing status of residents of local communities. These departments can also stimulate research in universities and hearing centers.

Hearing Centers

State health departments interested in starting hearing conservation activities could well begin by supporting financially the development of demonstration hearing centers. If such centers already exist, funds could further more complete hearing conservation services.

A hearing center, while supplying early detection, definitive diagnosis, care, education, and rehabilitation services for persons with hearing impairments and related speech impairments, can also play a variety of roles. Perhaps its most important one is to offer undergraduate, graduate, and postgraduate training for medical and paramedical personnel. But the center can also assist in training school and industrial audiometric technicians, conduct clinical research, and give evaluative and consultative services to private physicians.

It may serve as the base of operations for demonstration teams with various degrees of testing skill.

Hearing Conservation Clinics

The twin objectives of bringing highly specialized diagnostic services to areas distant from medical centers and increasing the opportunities for learning by physicians in this field can be adequately met by conducting hearing conservation clinics at strategic locations. The clinics can be staffed by specialists from university-based audiology centers. Some important advantages of regional clinics follow.

1. A convenient and effective liaison is established for handling referred cases.
2. The local community is provided with a center for hearing conservation activities.
3. General practitioners, pediatricians, internists, and otologists receive consultation or referral services. Opportunities for additional experience are more readily available.
4. Experience gained through such centers has been immensely useful to otolaryngological departments of medical schools by broadening the training of resident staff members and increasing their knowledge of the public health aspects of prevention.
5. As more of the hard of hearing are identified, information gained from the increased number of cases will provide additional resources for teaching in medical schools.
6. Other assets include better diagnostic and patient training facilities. These can reduce unnecessary prescriptions for hearing aids and avoid discouraged patients who discard their hearing aids.

Community Coordination

In communities where more than one agency or department conducts various types of hearing conservation activities there is a need for coordination. This coordination may be informal when the number of agencies is small and the activities are limited in scope. However, in larger cities and in counties where the population density is great, the agencies providing services often are numerous. State and local health departments can be especially helpful by supplying leadership and stimulating the

organization of a committee or council whose members discuss common problems and exchange information concerning current projects. As programs expand and activities multiply, such a committee can prevent needless duplication of effort and insure a more efficient division of labor among the cooperating groups.

Steps for Starting a State Program

1. Select an interested and qualified individual in the health department who will be responsible for the direction of hearing conservation activities.
2. Organize advisory committees to coordinate planning with medical societies, appropriate private health agencies, and other interested groups such as educational boards and vocational rehabilitation agencies. The objective would be to secure maximum cooperative community action among the several groups and professions concerned.
3. Set up comprehensive, university-based hearing centers or strengthen those already in existence. State health departments should take vigorous leadership in this in all ways possible, including financial assistance. Such leadership is a fundamental first step. The highly complex professional skills and equipment must be available if adequate guidance and technical leadership are to be offered.
4. Organize hearing conservation clinics in strategic geographic areas. These clinics should be directly supervised by the staffs of university-based hearing centers.
5. Select areas to conduct pilot projects in such a way as to provide analyzable data for evaluating results. If successful, these pilot projects would form a sound basis for extending hearing conservation activities more widely within the State.
6. Step up hearing screening programs in preschool, school, and in adult populations such as those in industry, military services, and hospitals.
7. Public health nurses and social workers should assume responsibility for careful follow-up of persons with known or suspected problems to see that they have secured specialized diagnosis and care and to direct them to care if necessary.

8. To give impetus and direction to the steps listed, both State and local health departments should engage in a continuous program of clinical research, personnel training, and public education with respect to all phases of hearing conservation.

Summary

The number of persons in the United States afflicted with hearing defects and related speech defects is large enough to warrant the development of much more adequate services for preventing, finding, evaluating, treating, and rehabilitating persons with such defects.

Training facilities for an expanded number of therapists, technicians, audiologists, and other otological personnel are needed. Much

more lay and professional education is warranted if present latent demands for service ever are to be met. Much more well-supported, applied research in hearing conservation methods must be promoted.

Both State and local health departments must be more concerned with the prevention and correction of hearing and related speech defects. These defects, by their very number, constitute a major public health problem.

The prime need at the moment is for physicians and public health workers to reevaluate their responsibility in respect to hearing conservation and exert the leadership of which they are capable, and, by this leadership, stimulate the development of adequate State and local hearing conservation programs.

Air Pollution Monitoring

The Public Health Service is establishing a continuous air monitoring program to provide information on air pollution levels in eight major cities, Chicago, Cincinnati, Detroit, Los Angeles, New Orleans, Philadelphia, San Francisco, and Washington, D.C. The sampling program is intended to give precise information on the continuously changing levels of pollutants, for use in research and epidemiologic studies dealing with the effects of air pollution.

The monitoring equipment, built by the Public Health Service and operated by specially trained employees of the participating cities, is designed to provide automatic measurement and analysis of the levels of seven gaseous pollutants associated with automotive emissions—sulfur dioxide, nitric oxide, nitrogen dioxide, carbon monoxide, ozone, total hydrocarbons, and total oxidants. In addition, measurements will be recorded of wind turbulence, particulate pollutants, and pollutants washed out of the air by rain.

The continuous monitoring will not supplant the periodic sampling conducted by the National Air Sampling Network of the Public Health Service. This sampling network provides information on the average levels of radiation and particulate matter at some 200 urban and rural sites, and on the average levels of sulfur dioxide and oxides of nitrogen at 50 sites.